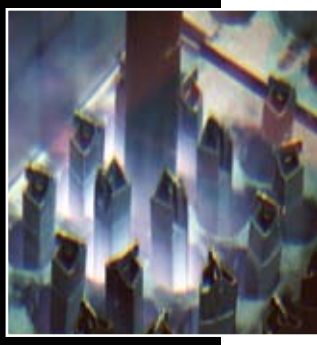
THE ADVANCED TEST REACTOR AT THE INL



A nuclear reactor is basically an elaborate tool to produce power. Reactors work by splitting atoms, the basic building blocks of matter, to release large amounts of energy. In commercial power reactors, that energy heats water, which creates steam. The steam turns turbines, generating electricity.

What makes the Advanced Test Reactor, located at the Idaho National Laboratory, unique from most other reactors is that it isn't designed to generate electricity. Instead, it is a test reactor designed to generate high concentrations of energy in the form of neutrons, and deliver them with pinpoint precision to specific test locations within the reactor.

The ATR is a virtual "time machine." That is, the ATR is able to produce an extremely high neutron flux. This enables scientists, for example, to place materials in the reactor and then expose them to high concentrations of neutrons to duplicate in only weeks or months the years of exposure that such materials would experience in a commercial nuclear reactor's radiation environment. The ATR's core design allows many experiments to be conducted simultaneously, with each experiment receiving a different and carefully controlled level of radiation.

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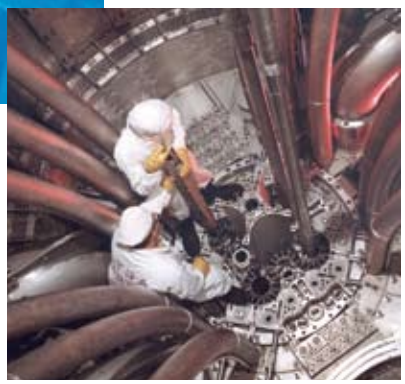
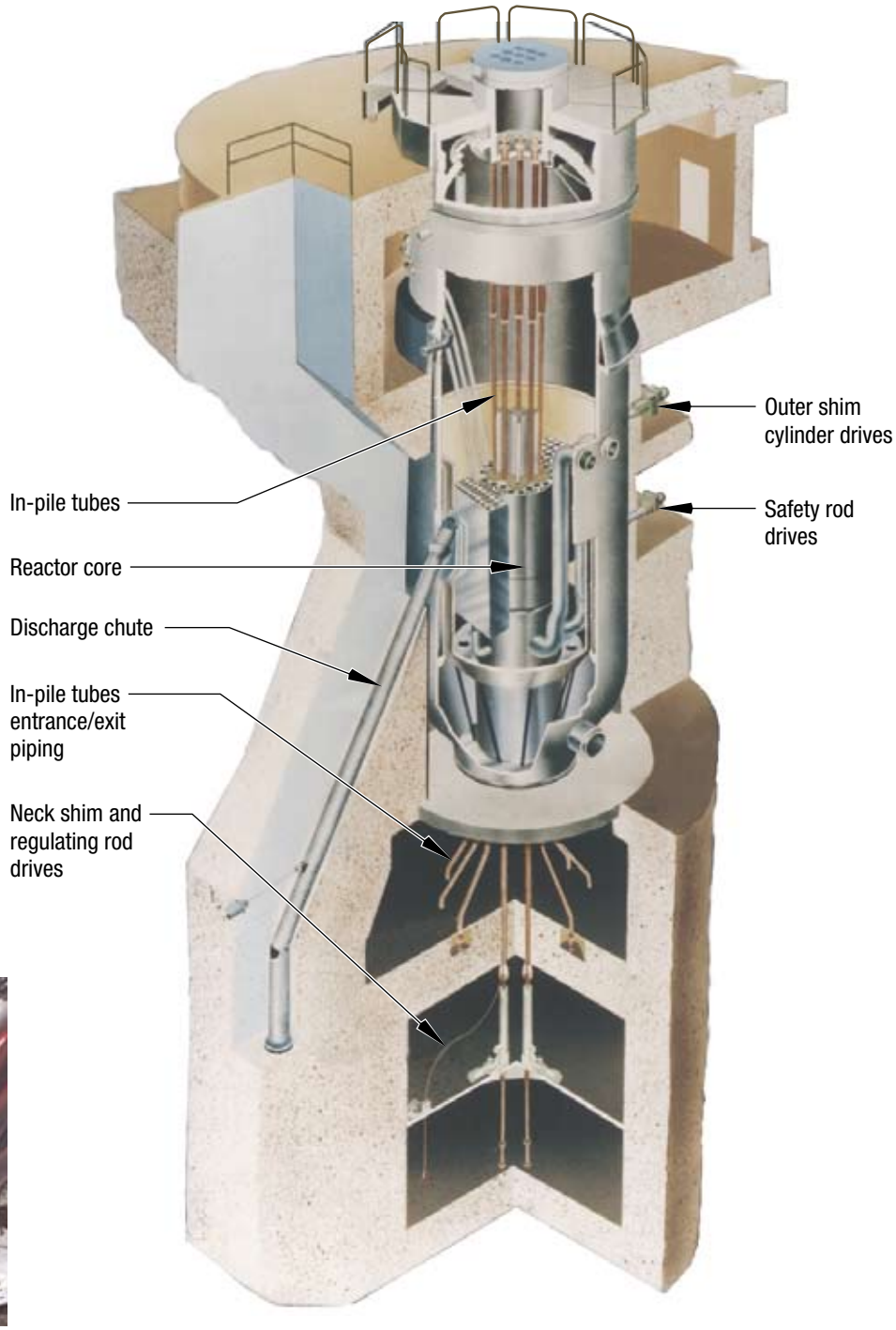
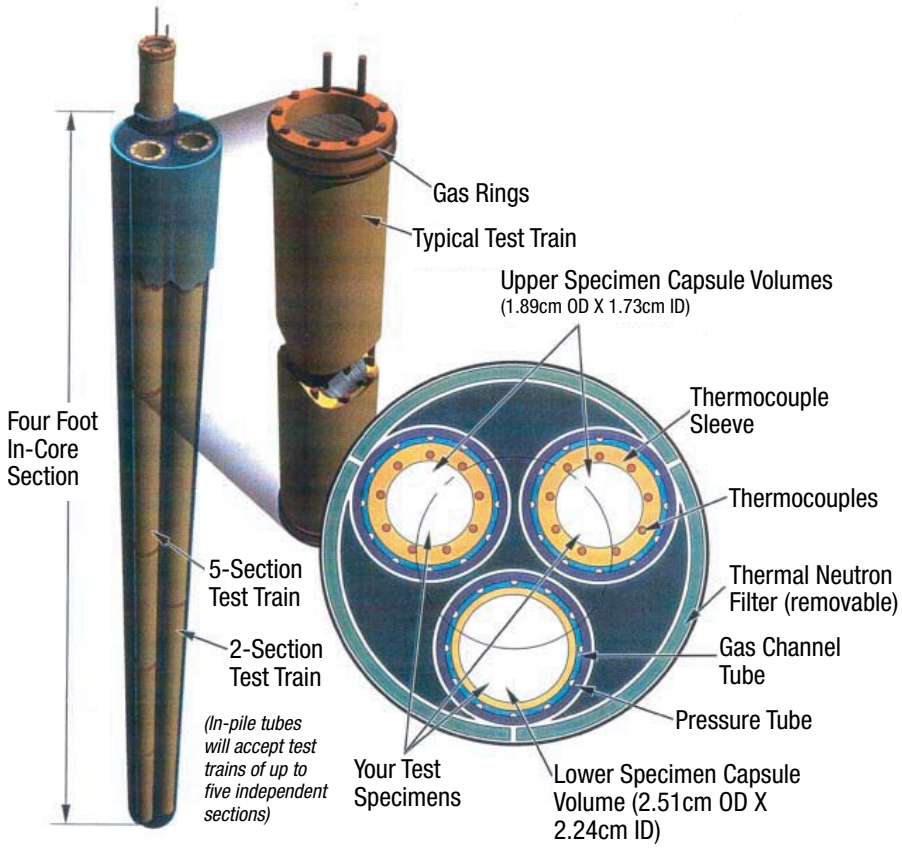




The Advanced Test Reactor's missions include materials and nuclear fuels testing for the Navy. It also produces medical isotopes for diagnosing and treating diseases, and performs materials and nuclear fuels testing for government and university research reactors and the commercial nuclear power industry.

It is safe because:

- Unlike large, commercial power reactors, which operate at high temperatures and pressures, ATR is a low-temperature, low-pressure reactor. It operates at about the same temperature and pressure as a hot water heater in a typical home. As a result, it doesn't have the force that would expel large amounts of radiation in the event of an accident. Therefore, it doesn't need a large containment dome like you see at big commercial reactors.



- A confinement structure does surround the reactor area. It serves as an additional barrier in the highly unlikely event of a release of radioactivity. ATR's confinement structure is similar to that used to cover most test reactors but the ATR vessel and vessel enclosure structure is significantly stronger than typical test reactors.
- It's not located in an area where there is much earthquake activity. Although several significant earthquakes have occurred in the mountains around the INL, the site itself and the ATR have been well isolated from these events. According to the U.S. Geological Survey, the ground motion predicted near the ATR is less than one fifth that of San Francisco and less than one third that of Jackson Wyoming. The ATR site has a relatively low earthquake hazard for any Western United States location.
- ATR has been through several earthquake studies with upgrades as the state of the art in seismic engineering has evolved over its lifetime. Upgrades have been constructed as needed to comply with contemporary safety standards. Generally, the design has proven to be robust and needed upgrades have been relatively minor. Although no structural deficiencies against current standards have been identified, a comprehensive seismic analysis/upgrade program has been initiated. This program will determine whether the latest seismic engineering methods and safety standards will require further upgrades in the plant.

- If electrical power to the reactor is lost or if even a minor earthquake occurs, it automatically shuts itself off immediately with no human intervention, using gravity.
- The reactor has operated since 1967. ATR's unique design allows the reactor's internal parts to be replaced as needed, typically every 8 to 10 years. Studies have shown that the ATR's stainless steel vessel that surrounds its core has experienced little, if any signs of aging. That's because the way it is designed, it isn't subjected to anywhere near as much of the aging force of neutrons as the vessels in most nuclear plants.

The ATR has an excellent performance history and continues to operate safely and economically.

test reactor

For more information about ATR:

http://www.inl.gov/featurestories/2004-11-01.shtml

http://nuclear.inl.gov/docs/factsheets/unparalleled_atr.pdf

http://www.inl.gov/featurestories/2005-12-14.shtml

http://nuclear.inl.gov/docs/factsheets/atr.pdf

http://newsdesk.inl.gov/index.cfm?file=20050720